The Defense Nuclear Facilities Safety Board

STRATEGIC PLAN

FY 1999 – 2004

AUGUST 3, 1999

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WHO WE ARE

The Defense Nuclear Facilities Safety Board (Board) is an independent executive branch agency charged with providing technical safety oversight of the Department of Energy's (DOE's) defense nuclear facilities and activities. A defense nuclear facility is defined in the Board's enabling statute as a production, utilization, or nuclear waste storage facility.[1] The Board, assisted by a highly qualified staff, is made up of five respected experts in the field of nuclear safety with demonstrated competence and knowledge relative to independent investigations and oversight. Congress established the Board in September 1988 in response to concerns about the need for significant improvement to ensure that DOE adequately protects the health and safety of the public and workers at defense nuclear facilities.

Congress empowered the Board to provide advice and recommendations to the Secretary of Energy regarding public health and safety issues at these defense nuclear facilities. In so doing, Congress sought to provide the public with added assurance that the defense nuclear facilities required to maintain the nation's nuclear weapons stockpile are being safely designed, constructed, operated, and decommissioned.[2]

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[1]The Board's enabling statute excludes from the definition of defense nuclear facilities those facilities pertaining to the Naval nuclear propulsion program, facilities involved with transportation of nuclear explosives or nuclear material, facilities that do not conduct atomic energy defense activities, and waste storage facilities licensed by the Nuclear Regulatory Commission.

[2]As used in the Board's enabling statute, decommissioning is a broad term that encompasses operations and activities leading up to final disposition of the facility and environmental restoration, including deactivation, decontamination, final process runs, removal of special nuclear material, residues, and wastes, and additional steps necessary to ensure adequate protection of public and worker health and safety. DNFSB/TECH-12, *Regulation and Oversight of Decommissioning Activities at Department of Energy Defense Nuclear Facilities*, provides further clarification on this matter.

THE RISKS WE FACE

Numerous radioactive and toxic materials exist throughout the defense nuclear complex, and there are many pathways by which these hazards might be released, creating risks to the workers and the public. The integrity of facilities or structures which confine hazardous materials can be threatened by earthquakes, extreme winds, floods, lightning, and other such natural phenomena. Other potential release mechanisms include operator errors, equipment malfunctions, chemical reactions, fire, ignition of explosives, and inadvertent nuclear criticality events. If these hazards and their potential release mechanisms are not carefully addressed, the consequences of a resulting accident could include exposure to unacceptable radiation levels, uptake of radioactive materials, other serious compromise of the health and safety of the public and onsite workers.

The Board conducts its oversight of DOE so as to reduce the risks that exist in the defense nuclear complex to the greatest extent possible. Examples of those risks include:

- Hundreds of tons of fissionable material, in various forms, housed in 50-year-old buildings and structures.
- Thousands of nuclear weapons being dismantled, evaluated, or modified.
- Hundreds of tons of plutonium, including components from dismantled nuclear weapons.
- The nation's strategic inventory of tritium gas, including thousands of individual containers removed from nuclear weapons.
- Thousands of tons of deteriorating nuclear fuel in water-filled storage basins.
- More than one hundred million gallons of high-level radioactive waste awaiting treatment.

THOSE WE SERVE

As a government agency, we see the following as those potentially affected by or interested in the Board's mission:

- The Public
- The Workers in the Defense Nuclear Complex
- Other Federal, State and Local Agencies
- The Department of Energy
- The Administration and Congress

Public Meetings

A key element in improving public assurance of the safety of defense nuclear facilities is providing readily accessible and relevant information. From 1990 through 1999 the Board held 32 public meetings at or near DOE defense nuclear facilities, with an additional 36 public meetings held in Washington, D.C. Such meetings allow the public to observe the Board's interactions with DOE on health and safety topics of particular interest. The Board also maintains a public reading room at its Washington, D.C., headquarters and provides an Internet Web site to facilitate access to public-record information. The bound volumes of public meeting transcripts shown to the left represent a small sample of the 2.5 million pages of records for public review.

MISSION

The mission of the Board is to oversee the safety of DOE's defense nuclear facilities with the objective of helping to protect the health and safety of the public and workers.

The Board's mandate is provided by its enabling statute, 42 U.S.C. 2286, which directs the Board to:

- "Review and evaluate the content and implementation of standards relating to the design, construction, operation, and decommissioning of defense nuclear facilities of the DOE ... [and] recommend to the Secretary of Energy those specific measures that should be adopted to ensure that public health and safety are adequately protected."

- "Investigate any event or practice at a DOE defense nuclear facility which the Board determines has adversely affected or may adversely affect public health and safety."

- "Review the design and construction of new DOE defense nuclear facilities and recommend to the Secretary of Energy such modifications considered necessary to ensure adequate protection of public health and safety."

- "Analyze facility design and operational data."

Through these functions, the Congress intended that the Board would:[3]

- "Assure and enhance the safety of operations of DOE's defense nuclear facilities by providing independent advice to the Secretary of Energy, and critical expertise, technical vigor, and a sense of vigilance within the Department at all levels."

- "Be instrumental in helping DOE develop appropriate and operationally meaningful safety standards, and ensure the transition of these standards into clear and consistent requirements for DOE management and contractors."

- "[Substantially] raise the technical expertise of the Department."

- "Assist and monitor the continued development of DOE's internal Environment, Safety, and Health organization."

- "Above all, identify the nature and consequences of any significant potential threats to public health and safety, elevate such issues to the highest levels of authority, and inform the public."

- "Provide a meaningful opportunity for public participation in the recommendation process."

[3] Congress stated its goals in establishing the Board and commented on its expectations for the Board in the Report of the Senate Armed Services Committee on S.1085, a predecessor to the bill which established the Board. S. Rep. No 232, 100th Cong., 1st Sess. 10 and 20-21 (1987)

NATURE OF THE BOARD'S WORK

- The Board stays closely attuned to the planning and execution of DOE's defense nuclear programs, gathering its information from a broad range of sources, including but not limited to on-site technical evaluations by the Board and its staff, critical review of DOE safety analyses by competent technical experts, public meetings in the field and at the Board's headquarters, and daily input from the Board's Site Representatives assigned to the highest priority defense nuclear facilities.

- Based on the information thus gained, the Board chooses from the broad spectrum of action-forcing mechanisms granted it by law to communicate identified concerns and promote appropriate DOE corrective action. These action-forcing mechanisms include formal recommendations to the Secretary of Energy and to the President in the case of an imminent threat to public health and safety, requests for reports from DOE, public meetings or hearings, technical exchanges and issuance of technical reports, and investigations.

- After a safety concern is identified and communicated to DOE, the Board and its staff ensure that appropriate corrective actions are developed by DOE and its contractors, commitments are made to implement these corrective actions in a timely manner, and that these commitments are met.

- The Board's safety oversight focuses on technical issues associated with mission-specific operations, which change as DOE's mission shifts. The Board also identifies and addresses fundamental and complex-wide safety management deficiencies, which are generally not impacted by DOE's changing mission.

- During each annual performance reporting period, as DOE's mission changes and as the Board's independent evaluations identify previously-unknown safety concerns, resources will often be redeployed within and among the three general goals addressed in this strategic plan.

VISION

To promote standards of excellence in all facets of health and safety oversight of the Department of Energy's defense nuclear facilities, and to establish and institutionalize a safety culture within DOE from the highest management levels to individual workers that insists work be done safely.

VALUES

As individuals and as a team, we strive to uphold the following values:

EXCELLENCE

We continually evaluate and upgrade our health and safety oversight capabilities, and target those DOE activities for priority attention according to the degree of risk reduction to the public's health and safety. We are committed to consider the technical and economic feasibility of our decisions and recommendations.

RESPONSIBILITY

We believe that the taxpayers, DOE, and its contractors deserve the best possible management of the Board's activities. We achieve this by conducting our independent technical oversight program based on the best available knowledge obtained through site visits, historical documentation, scientific research and analysis, technical expertise, and operational experience.

INTEGRITY

The integrity of the Board's practices and procedures is crucial to ensure public health and safety at DOE nuclear facilities and to restore public confidence in DOE stewardship of the defense nuclear complex. Public access to the Board is promoted by public hearings, requests for public comment, and meetings with contractors, DOE representatives, members of the public, labor unions, and public interest groups.

PEOPLE

Our greatest strength is our workforce. We aggressively built, and continue to recruit, a cadre of highly qualified engineering and scientific experts. We continually develop and strengthen their skills by providing advanced formal education and hands-on training. We believe that all employees contribute to our success, and we continuously seek ways to improve.

KEY EXTERNAL FACTORS AND ASSUMPTIONS

The mission of the DOE defense nuclear complex has changed significantly since the Board's establishment, and will continue to evolve. The Board focuses its safety oversight on technical issues associated with mission-specific operations, which can change when DOE's mission shifts. A major accident or safety-significant event at a DOE facility involving special nuclear material would also dictate significant changes in priority and focus. In addition, the Board will continue to identify previously unrecognized safety concerns, which DOE will need to address. National security requirements may also change. As these changes occur, the Board will redeploy its resources and modify some of its strategic and performance planning targets accordingly.

KEY EXTERNAL FACTORS

Should any of the following events occur, the Board's priorities will be changed significantly, requiring a reallocation of resources and a major revision to its strategic planning goals:

- A major accident or safety-significant event at a DOE facility involving special nuclear material.
- DOE's schedule for major actions in the defense nuclear complex changes based on circumstances within or beyond its control, requiring a corresponding change in the Board's oversight plan.

KEY ASSUMPTIONS

- Current U.S. national security policy affecting DOE nuclear weapons stockpile stewardship and management remains unchanged.
- The Administration maintains its moratorium on the underground testing of nuclear weapons. Resumption of full-scale underground testing would require a major shift in the Board's resources for oversight.
- DOE's commitment and approach toward the stabilization of hazardous legacy materials and cleanup of contaminated defense nuclear facilities remain consistent with the current approach, as defined in the DOE Strategic Plan for FY 1997 - FY 2002.
- The Board's current statutory authority and responsibilities in the DOE defense nuclear complex remain unchanged.

SAFETY OVERSIGHT PRINCIPLES

The Board executes its safety oversight responsibility according to the following principles:

- The primary responsibility for ensuring protection of the health and safety of the public and workers belongs with DOE line managers and extends in an unbroken chain from the Secretary of Energy to the workers on the floor.

- As an external action-forcing agency, the Board influences DOE line management actions to the extent needed to achieve safety objectives.

- Effective safety management demands that safety expectations be clearly defined and tailored to specific hazards at all levels—site, facility, or activity.

- Technical expertise is required to define controls commensurate with the identified hazards and to ensure compliance.

- Safety oversight activities are prioritized largely by risks to the workers and the public. Key indicators are the types and quantities of nuclear material at risk and the process and setting of the operations involved.

- Safety oversight responsibilities for defense nuclear facilities will be accomplished in full cooperation with other agencies, such as individual states and the EPA, for final cleanup, demolition, and environmental restoration activities, in compliance with responsibilities mandated by the Atomic Energy Act of 1954, as amended, and federal environmental laws.

GENERAL GOALS

Using its action-forcing powers, the Board seeks to effect the following outcomes:

1. **Complex-Wide Health and Safety Issues.** Integrated safety management (including comprehensive health and safety requirements, technically competent personnel, and effective implementing mechanisms) continues to evolve through feedback and improvement, and is implemented in all life cycle phases—design and construction, startup, operation, and decommissioning.

2. **Safe Stewardship of Nuclear Weapons Stockpile and Components.** Nuclear weapons stockpile support and defense nuclear research activities continue to be planned and executed safely at DOE's defense nuclear facilities.

3. **Safe Disposition of Hazardous Remnants of Weapons Production.** Hazardous remnants of nuclear weapons production are appropriately characterized, stabilized, and stored; and legacy facilities are decommissioned in a manner that protects the workers and the public.

GOAL 1: Complex-Wide Health and Safety Issues

Integrated safety management (including comprehensive health and safety requirements, technically competent personnel, and effective implementing mechanisms) continues to evolve through feedback and improvement, and is implemented in all life cycle phases—design and construction, startup, operation, and decommissioning.

This general goal addresses the Board's efforts to facilitate the complex-wide implementation of integrated safety management[4] throughout the DOE defense nuclear complex. Achievement of this goal will require a multiyear, multisite, multifocus effort by the Board during each annual performance period covered by this Strategic Plan. The Board's three strategic objectives that support this goal encompass a broad spectrum of technical areas relevant to the safety of DOE's defense nuclear mission.

Objectives for GOAL 1: At the urging of the Board, DOE is pursuing implementation of standards-based safety management throughout the defense nuclear complex. The elements of the integrated safety management approach include (1) a strong foundation of comprehensive health and safety requirements and guidance promulgated through DOE's directive system, (2) assurance that federal and contractor personnel have the technical competence necessary to execute their responsibilities, and (3) development and implementation of effective safety management mechanisms throughout all portions of a facility's life cycle. Through this goal, the Board focuses attention on DOE's progress in all of these complex-wide areas, seeking to identify additional means by which full and effective implementation of integrated safety management can be expedited.

Examples of several challenges addressed by this goal are listed below.

- New and revised DOE directives should provide an adequate set of health and safety requirements and guidance for the design, construction, operation, and decommissioning of older and modified facilities as well as for new facilities. For example, the existing controls and limits for work involving the stable metal tritide form of tritium, a nuclear weapon material, lack a sound technical basis, indicating a need to develop specific requirements and guidance.

- Sufficient personnel expertise and knowledge must be maintained to support both nuclear weapons and nuclear weapon materials related activities. A specific focus on the identification of critical technical expertise and knowledge required to complete important mission activities is needed. Loss of this expertise through retirement and attrition without compensatory training and mentoring of replacement personnel could jeopardize these activities.

[4] Integrated safety management (ISM) is the means by which the Department of Energy is institutionalizing the process of incorporating into the planning and execution of every major defense nuclear activity those controls necessary to ensure that environment, safety and health objectives are achieved.

- Facility design and operation must reflect an appropriate balance of engineered features and administrative controls to provide for the health and safety of the worker and the public. Determining the adequacy of older facilities that do not meet current design requirements will often dictate a unique, activity-specific set of compensatory measures.

In support of this goal, the Board will pursue the following specific objectives, with greater detail and measurable target levels of performance to be provided in each Annual Performance Plan. After each objective, a brief example of the Board's past accomplishments is provided to illustrate the area of focus, along with a discussion of the types of activities the Board will undertake to achieve the objective during the strategic planning period.

OBJECTIVE 1-A: Improvement and Integration of Health and Safety Directives. The Board and its staff will verify that new and revised DOE directives contain adequate requirements for the protection of the health and safety of the workers and the public.

The Board's enabling statute requires it to "review and evaluate the content and implementation of the standards relating to the design, construction, operation and decommissioning of defense nuclear facilities." In six of its formal recommendations the Board has addressed the subject of health and safety directives, as such standards are termed. As a result, there is now widespread recognition within DOE that a comprehensive set of health and safety requirements must form the foundation for the integrated safety management of hazardous work. Review and evaluation of DOE's directives by the Board and its staff are ongoing. For example, in 1998 alone, the Board's staff reviewed and provided comments on 45 directives.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- The Board and its staff will review and assess proposed new DOE health and safety directives and safety-significant modifications to existing directives. When DOE issues new or modified health and safety directives after addressing the Board's comments, the directives will be in an enhanced form, resulting in improved safety through standardized requirements and guidance that provide for adequate protection of the health and safety of the workers and the public.

OBJECTIVE 1-B: Technical Competence. The Board and its staff will verify that the roles, responsibilities, experience, and competencies required to protect the workers and the public are explicitly defined and implemented for both DOE and its contractor personnel.

The technical competence of both federal and contractor workers is essential to safety at DOE defense nuclear facilities. Previous Board recommendations such as Recommendations 93-3 and 95-2 have focused DOE's attention on this issue. As a result, DOE launched a number of initiatives aimed at addressing technical competence, including a standardized technical qualification program. DOE has also formed a panel of senior line managers to oversee its corporate program for the development and technical capability at defense nuclear facilities. However, since the end of the Cold War, maintenance of the technical competence (both federal and contractor) essential to DOE's defense nuclear mission has been increasingly problematic. The Board has always placed considerable emphasis on this vital element of safety management, but erosion of DOE's capabilities continues as its workforce ages and experiences attrition. The Board will continue to closely monitor DOE's progress in this extremely important area.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- The Board and its staff will monitor closely DOE and its contractors' efforts to recruit, train, and retain a technical staff of exceptional quality, education, and experience. Identified areas of needed improvement will be communicated to DOE, and this information will be used to continually upgrade the quality of DOE's technical workforce.

OBJECTIVE 1-C: Complex-Wide Implementation of Integrated Safety Management. The Board and its staff will verify the effective and expeditious development and implementation of DOE's integrated safety management in facility design and construction, operation, and post-operation.

In response to the Board's Recommendation 95-2, DOE established an integrated safety management system for an initial group of operational defense nuclear facilities, and later expanded the approach DOE-wide. The Board and its staff have closely tracked DOE's development and field implementation of integrated safety management, and has held 10 public meetings to focus attention on DOE's progress and implementation concerns. Through face-to-face feedback and formal letters, the Board has prompted DOE and its contractors to make many specific improvements in their implementation of integrated safety management—particularly in the areas of work control, job hazard analyses, and feedback and improvement. In March 1999, these efforts by the Board resulted in a memorandum from the Secretary of Energy setting forth safety enhancements designed to institutionalize the basic elements of meaningful oversight, enforcement, and accountability for safety management. DOE has made considerable progress in upgrading its programmatic direction for an integrated safety management system in response to the Board's urging, guidance, and recommendations. However, observations to date indicate that extensive experience, feedback, and improvement will be required before effective implementation of integrated safety management and its associated cultural changes is fully realized in the DOE complex.

During the strategic planning period, the Board will undertake reviews of the following general types in support of this objective:

- The Board and its staff will review development and implementation of DOE's integrated safety management program, including the effectiveness of DOE's feedback and improvement function. Identified areas of needed improvement will be communicated to DOE, and this information used to continually upgrade the quality of the program.

- The Board and its staff will review design and construction activities, including technical project management, criteria development, design preparation, and construction, and communicate any identified issues that will require resolution to provide for adequate protection of the workers and the public. Selection for review will be based on relative hazards, and on DOE's schedule and progress on the candidate facilities. An adequate approach and schedule for resolution of issues identified by the Board will be established to support safe start-up and operation of new or modified defense nuclear facilities.

GOAL 2: Safe Stewardship of Nuclear Weapons Stockpile and Components

Nuclear weapons stockpile support and defense nuclear research activities will be planned and executed safely at DOE's defense nuclear facilities.

This general goal addresses the Board's efforts to support DOE's safe execution of its national security mission. During each annual performance period covered by this Strategic Plan, the Board will present progress toward achievement of this goal through its evaluation of DOE's work at multiple sites in direct support of the nuclear weapons stockpile, as well as associated research and development. Many of DOE's programs in this area do not yet have detailed schedules and milestones and will likely span multiple years. Correspondingly, the Board's oversight efforts will also be multiyear. The Board's two strategic objectives that support this general goal address the safe execution of various activities within DOE's two primary nuclear weapon mission components—direct support of the stockpile and nuclear weapon research and development activities.

Objectives for GOAL 2: Nuclear weapons continue to play an integral role in U.S. national security policy. By their nature, the operations to maintain a nuclear weapons stockpile involve hazards that, if not adequately controlled, could pose unacceptable consequences to the public and the workers. Therefore, DOE must ensure that the unique hazards associated with nuclear weapons and components are adequately controlled in a tailored, integrated safety management system. The Board will maintain safety oversight of DOE's nuclear weapons operations in fulfillment of national security objectives.

Examples of several challenges addressed by this goal are listed below.

- Nuclear weapon activities involve disassembly, inspection, modification, refurbishment, or retirement of hundreds of nuclear weapons each year. Due to the unique hazards of nuclear explosive operations, these activities must be conducted only after rigorous evaluation of the safety of operations and only with effective and reliable safety controls in place.

- Nuclear weapon-related activities occur at only a small number of DOE sites such as the Pantex Plant near Amarillo Texas. Natural phenomena at these sites such as tornados or lightning storms present unique hazards to nuclear explosives which must be carefully evaluated and safely controlled.

- As a matter of national policy, production of new nuclear weapon systems has stopped, and dismantlement of a large fraction of the nuclear weapons stockpile is under way. Existing weapon systems are likely to remain in the nation's stockpile longer than in the past, potentially much longer than their original design lifetime. As these weapons age, changes may occur in components that present hazards, such as high explosives, as well as in components that provide safety features. The individual and combined effects of the changes must be assessed and

eventually even predicted to ensure DOE operations with these weapons remain safe. DOE must also safely store strategic reserve components such as pits and secondaries to maintain the ability to replace aging components.

- Another aspect of weapon systems remaining longer in the active stockpile is the need for DOE to consider Life Extension Programs (LEPs) for specific weapon systems. These activities will likely involve modifications to substantial numbers of weapons in the foreseeable future. These life extension programs will result in significant increases in the pace of hazardous activities at defense nuclear sites, particularly at Pantex and the Oak Ridge Y-12 Plant.

- Refurbishment and replacement of nuclear weapon components will require DOE to establish a capability to produce new plutonium pits (the core of a nuclear weapon). This capability entails its own unique hazards and necessary safety controls.

- With the Administration's commitment to the Comprehensive Test Ban Treaty, all underground testing of nuclear weapons has ended. DOE must continue to certify the safety and reliability of the nuclear weapons stockpile through cutting-edge research and simulation. This change in focus requires a shift in DOE capabilities particularly at the national laboratories. The new facilities and activities necessary for this mission pose nuclear safety hazards that must be adequately controlled. One particularly pressing need is the requirement to replace the aging Chemistry and Metallurgy Research facility at LANL with a new facility that can more reliably support Stockpile Stewardship and pit production.

In support of this goal, the Board will pursue the following specific objectives, with greater detail and measurable target levels of performance to be provided in each Annual Performance Plan. After each objective, a brief example of the Board's past accomplishments is provided to illustrate the area of focus, along with a discussion of the types of activities the Board will undertake to achieve the objective during the strategic planning period.

OBJECTIVE 2-A: Safe Conduct of Stockpile Management. The Board and its staff will verify the safety of DOE's defense nuclear facilities and activities relating to the maintenance, storage, and dismantlement of the nuclear weapons stockpile.

In response to past initiatives by the Board, DOE established an integrated work and safety planning approach at the Pantex Plant, called Seamless Safety-21st Century or SS-21, to successfully introduce engineered safety features into several weapons programs. This process was also used in the Life Extension Program for the W87 (an enduring stockpile warhead used on the Peacekeeper missile system) resulting in an improved hazards analysis and engineered safety controls. Under this enhanced safety process, DOE safely completed the first W87 Life Extension Program production units in time to support military requirements.

Stockpile management is essentially the industrial aspect of maintaining a safe and reliable nuclear weapons stockpile. The Board's recent focus at DOE's Defense Programs sites has been primarily on dismantlement of retired nuclear weapons; this may continue for some time. The disposition of non-strategic pits, which are nuclear weapons components made of fissile material, is still on the horizon. As noted above, DOE is also expanding programs to extend the life of weapons in the enduring stockpile, which will require more complex operations than dismantlements (i.e., re-assembly as well as disassembly) and will involve large numbers of weapons. These types of activities are characterized by relatively repetitive, predictable activities that will be conducted for the foreseeable future, thereby lending themselves to structured safety approaches based on well-analyzed processes and hazards. The Board's efforts to review safety at stockpile management facilities will concentrate on ensuring that sufficient numbers of qualified personnel, appropriate safety management systems and adequate physical infrastructure exist to conduct this long-term, steady state mission safely.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- Through staff reviews at weapons complex sites and the activities of Site Representatives, the Board and its staff will confirm that DOE develops and implements integrated safety management systems that are tailored adequately to the hazards of activities relating to stockpile management, and will communicate any needed enhancements to DOE for resolution. Issues identified by the Board will be resolved, or an adequate approach and schedule for resolution will be developed.

OBJECTIVE 2-B: Safe Conduct of Stockpile Stewardship. The Board and its staff will verify the safety of DOE's defense nuclear activities undertaken to ensure the continuing effectiveness of the nuclear weapons stockpile in the absence of underground nuclear testing.

Research and development operations at the Lawrence Livermore National Laboratory Plutonium Facility were halted in July 1997 because of concerns related to safety management, criticality safety, and conduct of operations. A review by the Board's staff found that the root cause of the problems leading to the suspension of operations could be traced to execution of the integrated safety management system at the Plutonium Facility. Since that time, the Board's efforts have been focused on guiding Plutonium Facility personnel in their development and improvement of programs and procedures for identifying hazards and implementing controls for the operations and storage of special nuclear and radiological materials. The combination of increased laboratory management attention, DOE mentoring and assistance, and strong oversight by the Board has resulted in the facility being restarted with substantial safety improvements while continually supporting important missions, such as stockpile stewardship and material disposition.

As part of the stockpile stewardship program, DOE is moving to define the infrastructure necessary to support the enduring nuclear weapons stockpile in the absence of nuclear testing. Unlike stockpile management, stockpile stewardship involves experimental research and development activities, which are often unique—they are not routinely performed like production operations. Each of these activities therefore requires a tailored safety management system that will ensure that the experiments are completed safely while achieving results that expand DOE's understanding of the stockpile. The conduct of DOE's subcritical experiment program, high-fidelity nuclear experiments, and basic nuclear weapons-related research will require the Board to oversee the health and safety aspects of the design, construction, and operation of new defense nuclear facilities and activities throughout this strategic planning period and beyond.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- Through technical reviews at research and development sites, the Board will assess DOE's efforts to develop and implement safety management systems for stockpile stewardship activities, including system and process designs, safety bases, control schemes, administrative programs, and operational lessons learned. Any needed enhancements identified as a result of the Board's reviews will be communicated to DOE, and an adequate approach and schedule for their resolution will be negotiated.

GOAL 3: Safe Disposition of Hazardous Remnants of Weapons Production

Hazardous remnants of nuclear weapons production are appropriately characterized, stabilized, and stored, and legacy facilities are decommissioned in a manner that protects the health and safety of the workers and the public.

This general goal addresses the Board's efforts to verify the safe disposition of hazardous nuclear weapons legacy materials and facilities. Achievement of this goal will require a multiyear, multifocus, multisite effort by the Board during each annual performance period covered by this Strategic Plan. The Board's oversight efforts in support of this goal are organized, in general, according to the hazardous nuclear material of focus. The Board's two strategic objectives that support this goal address DOE's efforts to reduce the risks of legacy materials by appropriate processing and disposition, as well as efforts to decommission production facilities and sites no longer essential to the national security mission.

Objectives for GOAL 3: More than 50 years of nuclear weapons production has resulted in a hazardous collection of surplus, legacy materials consisting of radioactive and chemically reactive metals, residues, spent fuel, and wastes throughout the DOE complex. Left unremediated, these materials represent a significant threat to the health and safety of facility workers and the public. This goal focuses on safely eliminating these potentially hazardous conditions.

Examples of several challenges addressed by this goal are listed below.

- Thousands of nuclear weapon plutonium pits are in interim storage pending disposition. Some of these pits are to be maintained for potential reuse, while most have been declared surplus. The current interim storage of these plutonium pits must be upgraded into safe long term storage. Subsequently, surplus pits must be safely converted into a form suitable for future disposition. Ultimately, material from these surplus pits must be safely dispositioned either by immobilization and disposal, or by fabrication into reactor fuel to be irradiated in commercial reactors.

- Tons of highly enriched uranium in solution is considered surplus. These solutions must be maintained in safe interim storage while a disposition path is developed. Eventually, these solutions must be safely processed to a form suitable for future disposition. It is likely that these solutions would be processed to remove impurities, blended to a low enriched isotopic concentration, and transported to a fuel fabrication facility for conversion into commercial reactor fuel.

- Classified plutonium metal weapon parts, in some cases containing berrylium, must be safely converted into a form suitable for future disposition. Most of this material will be melted and put into safe long term storage to await final dispositon.

It is the Board's intention to ensure that DOE places a high priority on reducing the risks that these high hazard materials pose and monitoring the

operations and activities involved in cleanup of defense nuclear facilities. Through its oversight of DOE defense nuclear facilities, the Board seeks to confirm that DOE's stabilization, disposition, and decommissioning programs are performed safely and completed without undue delay.

In support of this goal, the Board will pursue the following specific objectives, with greater detail and measurable target levels of performance to be provided in each Annual Performance Plan. After each objective, a brief example of the Board's past accomplishments is provided to illustrate the area of focus, along with a discussion of the types of activities the Board will undertake to achieve the objective during the strategic planning period.

OBJECTIVE 3-A: Material Stabilization. The Board and its staff will verify that DOE properly and safely characterizes, stabilizes, processes, and stores surplus plutonium, uranium, and other actinides, residues, spent fuel, and wastes from the nuclear weapons program, and that DOE provides for expeditious disposal of these materials, as needed.

In 1994, the Board issued Recommendation 94-1, *Improved Schedule for Remediation in the Defense Nuclear Facilities Complex*, which identified the legacy nuclear materials that pose the greatest immediate risks and requested DOE to greatly accelerate plans for stabilizing these materials. DOE's implementation plan for this recommendation now guides the most pressing cleanup activities throughout the defense nuclear complex, and has been used repeatedly as a means to ensure that appropriate priority and resources are assigned to these activities. Remediation of significant safety hazards included the elimination of large backlogs of plutonium solutions at the Rocky Flats Environmental Technology Site and the Savannah River Site, as well as major quantities of degraded spent fuel at Savannah River. Plans are now in place for addressing the most significant remaining hazards, including the degraded spent fuel at the Hanford Site, as well as the remaining plutonium materials located at various sites across the defense nuclear complex.

Stabilization of high-risk nuclear legacy materials will continue for decades. Design, construction, startup, and operation of new and modified facilities for this portion of DOE's environmental management mission will require continuing Board oversight throughout this strategic planning period. In addition, many of the structures, systems, and components utilized today in the DOE defense nuclear complex are in need of upgrading or replacement. As DOE pursues its defense and cleanup missions, the viability of this aging physical infrastructure must be established.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- Through staff reviews and the activities of Site Representatives, the Board will determine whether DOE's efforts to expeditiously stabilize, process, and store plutonium, uranium, other actinides, wastes, and spent nuclear fuel are conducted safely and in a timely manner using appropriate technologies, and that new systems are designed/constructed to appropriate standards. Any needed enhancements identified as a result of the Board's reviews will be communicated to DOE and an adequate approach and schedule for resolution will be developed.

OBJECTIVE 3-B: Facility Decommissioning. The Board and its staff will verify that DOE aggressively pursues the safe decommissioning of excess defense nuclear facilities that pose a significant risk to the workers or the public.

Decommissioning of some of the legacy facilities is under way across the DOE defense nuclear complex. The Board has focused its efforts on activities at the Rocky Flats Environmental Technology Site because of the significant risk posed by residual plutonium in the former process buildings at that site, and because Rocky Flats will be the first major site to be completely decommissioned. Rocky Flats has served as a test bed for implementing the principles of integrated safety management into short-duration, one-of-a-kind decommissioning activities. The Board's reviews have led DOE to improve the rigor of work planning, hazard analyses, and controls for these activities; upgrade worker protection measures; and more effectively ensure readiness to perform work safely. As a result, activities to drain plutonium-bearing liquid in process lines and to size-reduce contaminated equipment are being performed in a well-considered and safe manner, and these improvements are expected to benefit subsequent tasks.

The Rocky Flats Environmental Technology Site is the first large-scale defense nuclear site to face total decommissioning. The mission to conduct high-risk facility decommissioning activities that have begun at Rocky Flats will expand throughout the DOE defense nuclear complex at an increasing rate in coming years. These activities involve unique, hands-on, hazardous work that poses a direct challenge to DOE in a number of areas of historical weakness, such as hazard evaluation, development of work controls and procedures, worker training, and conduct of operations. Increased attention by the Board will be required to ensure that DOE conducts these high-risk activities safely.

During the strategic planning period, the Board will undertake reviews of the following general type in support of this objective:

- The Board and its staff will evaluate proposed new technologies, review the application of integrated safety management principles, and observe operations to confirm that decommissioning of excess defense nuclear facilities will be performed safely and in a timely manner. Board-identified issues will be resolved, or an adequate approach and schedule for resolution developed for these high-risk activities.

MEANS AND STRATEGIES

Technical Resources. Congress, in the legislation establishing the Board, took steps to ensure that the agency would have the technical expertise necessary to competently exercise its functions by specifying that, "The Board shall be composed of five members ... who are respected experts in the field of nuclear safety with a demonstrated competence and knowledge relevant to the independent investigative and oversight functions of the Board."

In addition, Congress authorized the Board to use special "excepted service" hiring authority to create a technical staff of the highest caliber. After years of careful recruiting and selection, the Board's technical staff is composed of approximately 60 scientists and engineers. Essentially all of the technical staff have a technical masters degree, and approximately 25 percent have doctorate degrees. The Board also stresses continued education and professional development for its staff as a means of ensuring that they retain and expand their capability to execute the Board's functions with the highest degree of competence.

Operational Resources and Processes. The Board focuses primarily on defense nuclear facilities and activities at the following 13 defense nuclear complex sites across the United States:

- Fernald Plant, Ohio
- Hanford Site, Washington State
- Idaho National Engineering & Environmental Laboratory
- Lawrence Livermore National Laboratory, California
- Los Alamos National Laboratory, New Mexico
- Miamisburg Environmental Management Project, Ohio
- Nevada Test Site
- Oak Ridge Reservation, Tennessee
- Pantex Plant, Texas
- Rocky Flats Environmental Technology Site, Colorado
- Sandia National Laboratories, New Mexico and California
- Savannah River Site, South Carolina
- Waste Isolation Pilot Plant, New Mexico

At these sites, the Board has identified 53 defense nuclear facilities that present the greatest health and safety risk. These facilities receive regular oversight attention and are the focus of a majority of the Board's technical resources; activities at lower-risk facilities receive less intensive oversight. The Board has deployed members of its technical staff as full-time Site Representatives at priority sites (currently at Hanford, Oak Ridge, Pantex, Rocky Flats, and Savannah River) to provide continuous on-site oversight. The Board encourages DOE to implement fundamental safety upgrades that can have positive health and safety impacts throughout the defense nuclear complex.

The technical basis for the Board's oversight is derived primarily from direct onsite evaluations conducted by the Board's technical staff and full-time Site Representatives. The Board applies considerable resources to support field technical reviews; approximately 178 team visits to defense nuclear sites were made in FY 1998 alone. The Board carefully considers the results of these technical staff reviews with the objective of identifying previously unknown safety issues that need to be brought to the attention of DOE and its site contractors for resolution and determining DOE's progress in correcting previously identified safety issues

Strategic Management. The Board's Strategic Plan establishes the framework for making management decisions, and describes the operational focus of what the Board does each year to progress toward achievement of each of the three general goals. To facilitate this operational focus, the Board has organized its technical staff into three technical groups. The technical lead of each group is assigned responsibility for one of the three general goals in this Strategic Plan.

RELATIONSHIP OF STRATEGIC PLAN TO ANNUAL PERFORMANCE PLANS

All of the Board's general goals and strategic objectives outlined in this Strategic Plan address multiyear efforts and encompass a broad spectrum of technical areas relevant to the safety of DOE's defense nuclear mission. The Board's Annual Performance Plans identify a specific number of reviews that will be conducted in support of each objective for that year, and identify candidate areas of focus for these reviews. The Board's outputs are the performance of these reviews and the identification of safety upgrades that can have a positive health and safety impact.

The Board's Annual Performance Plans also commit to measuring progress toward the achievement of each strategic objective and its associated overall goal. An outcome measure for each objective is identified, and each Annual Performance Report provides a qualitative assessment of this outcome. The Board measures progress toward each outcome by evaluating:

- DOE's acknowledgment of needed enhancements, in response to the Board's communication of the results of technical reviews.
- DOE's subsequent development of appropriate corrective actions.
- DOE's implementation of these corrective actions and successful resolution of the issue.

The basis for qualitative measurement will be formal correspondence, staff reports, DOE and contractor public testimony, and other sources.

Because of the variability of DOE's plans and schedules, some candidate areas of focus identified in the Board's Annual Performance Plans may not be addressed during a performance period. However, the Board's Annual Performance Report will demonstrate that an equivalent level of effort was expended in support of the strategic objective, and describe the alternate candidate that was selected for review.

PROGRAM EVALUATIONS

The Board's Annual Report

The Board is required to report annually to Congress on the improvements in safety achieved during the previous year, as well as pending safety issues that need to be addressed. These annual reports serve as a vehicle for communicating the Board's effectiveness in achieving its objectives and for identifying the major health and safety issues the Board is actively pursuing with DOE. In addition, the Board issues technical reports addressing various aspects of DOE's operation of the defense nuclear complex that impact public and worker health and safety. These reports provide in-depth discussion of current health and safety issues affecting one or more defense nuclear facilities, or generic topics such as the fundamentals for understanding standards-based safety management at defense nuclear facilities. To date, the Board has issued 23 technical reports.

The Board's full-time status and the size of the Board's technical staff allow continuous assessment of progress towards achieving its general and annual performance goals.

The Board also uses the results of program evaluations by other organizations concerning the safe operation of DOE's defense nuclear facilities as a means of measuring the Board's own effectiveness. In addition, the Board performs special evaluations, most notably a special supplement to the Board's Fifth Annual Report, *Assessing Board Effectiveness*, and a 1998 report, *Report to Congress on the Role of the Defense Nuclear Facilities Safety Board Regarding Regulation of DOE's Defense Nuclear Facilities.*